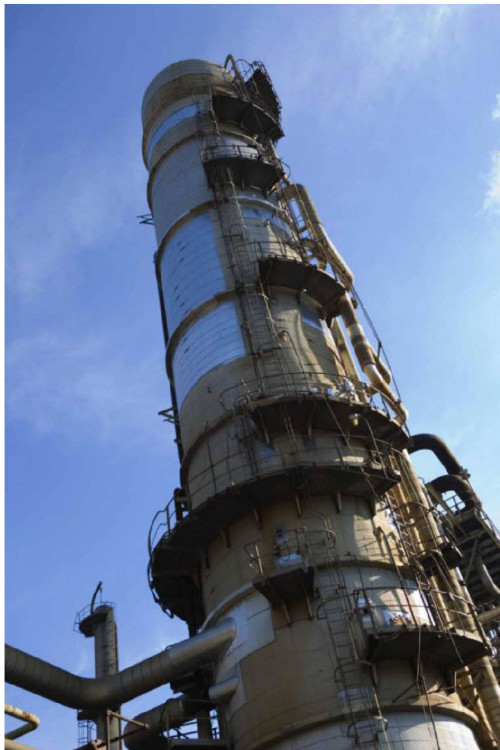


Corrosion by Amine Hydrochloride



Senior Analyst and Inspector Training
Crude Units

Corrosion by Amine Hydrochlorides



Characteristics

- Can occur wherever we use amines for neutralization
- Is primarily a concern in the atmospheric column and then only when amine is allowed, in one way or another, to enter the column. Can also cause corrosion in overhead systems.
- Amine hydrochlorides are highly hygroscopic, meaning they readily absorb water. Liquid amine hydrochloride is very corrosive; they can cause corrosion up to ~350°F (175°C).
- Amine hydrochlorides are just as corrosive to nickel alloys, such as Monel, as they are to carbon steel

Corrosion by Amine Hydrochlorides (Cont'd)



Prevention

- Use ammonia for neutralization rather than amines. This is supported by our Best Practice for most instances.
- If amines are used, don't inject them directly into the column and don't let them enter the column via hydrocarbon reflux
- Inject plenty of water to dilute/dissolve amine hydrochloride salts
- Ensure good desalting - 0.5 lb salt per thousand barrels oil max. (1.4 kg/m³)
- Inject caustic for further salt removal

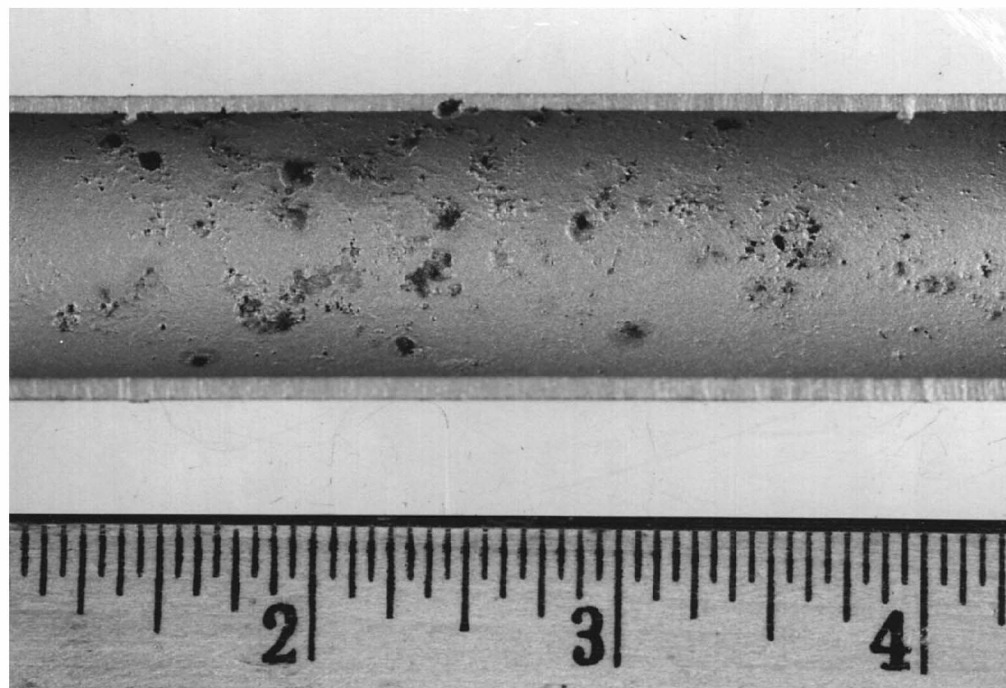
Inspection

- See Inspection Strategy IS-6 (API 571 #8)

Amine Hydrochloride Corrosion of 70 Cu - 30 Ni Atmospheric Overhead Condenser Tube From Perth Amboy



- *A change in crude feed resulted in higher chlorides and more amine injection in the overhead system*

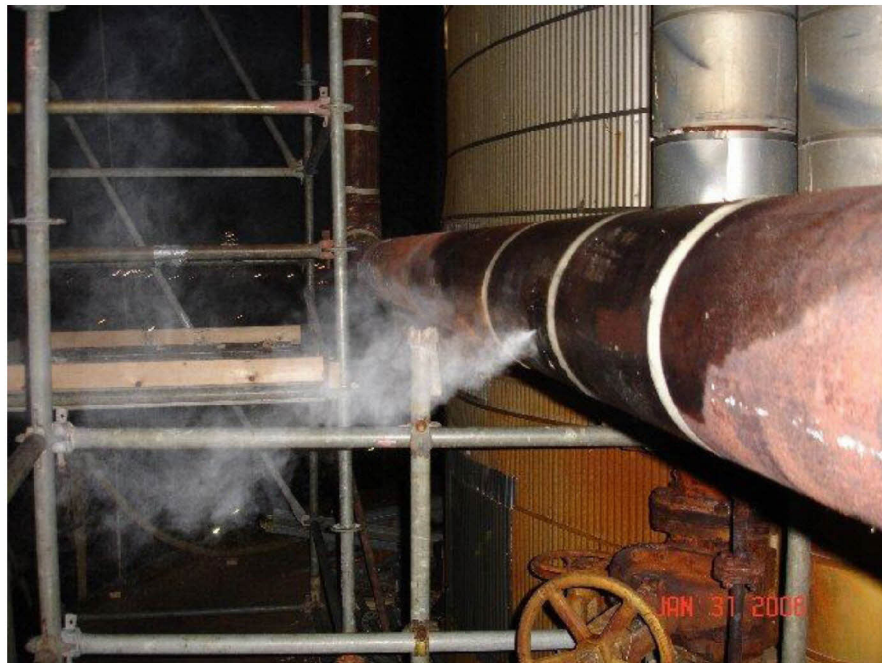


Inner surface of pitted tube after grit blasting to remove scale

Pascagoula's 1st Sidecut Leak



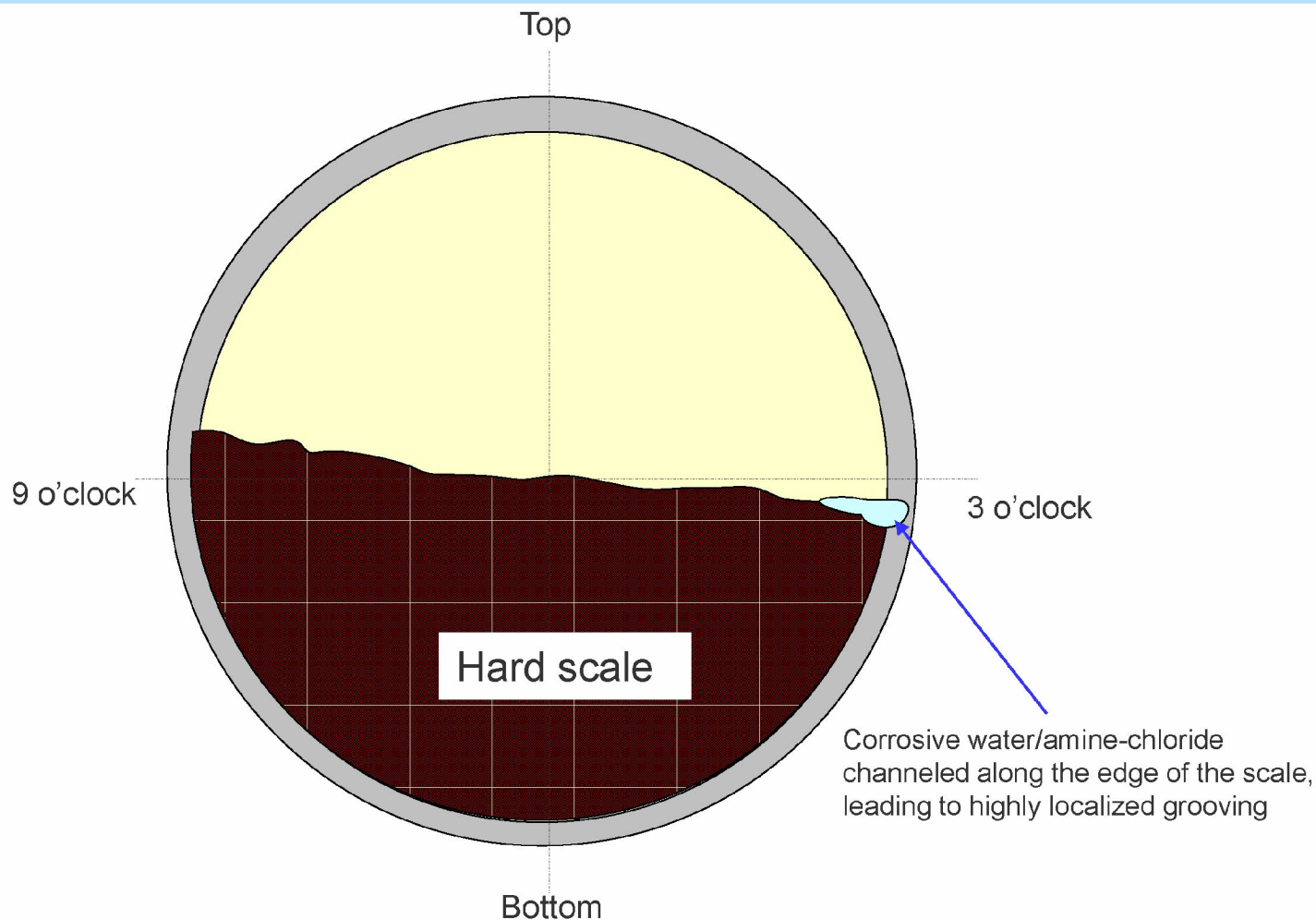
- Leak occurred in 2006 in Pascagoula's 1st sidecut
- Caused by deposits and a corrosive liquid thought to be MEA-HCl, probably with some water
- Sidecut had been experiencing unusually low temperatures for a 1st sidecut system



Pascagoula's 1st Sidecut Leak



Pascagoula's 1st Sidecut Leak



Infrared Thermography of Pascagoula's 1st Sidecut

